The collapse of a spherical bubble in a water tank in connection with Einstein's field equations

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ABSTRACT

In this talk an analysis of the Rayleigh–Plesset equation for a three dimensional vacuous bubble in water is presented. When the effects of surface tension are neglected we find the radius and time of the evolution of the bubble as parametric closed-form solutions in terms of hypergeometric functions. By including capillarity we show the connection between RP equation and Abel's equation, and we present parametric rational Weierstrass periodic solutions for nonzero surface tension. We conclude by comparing the Rayleigh–Plesset equation with Einsteins field equations for spatially curved Friedmann–Robertson–Walker cosmology with perfect fluid matter.